

Pre-Install Checklist

Customer Information

Note: This checklist is derived from Investor Confidence Protocols and PG&E's OBF Alternative Pathway HOPP. Grey checklist items are part of PG&E's OBF\_AP QA/QC, but do not apply to the CHEEF pilots. Red edits represent additional differentiation from the PG&E list

Customer Name	<div></div>	Site Address	<div></div>
Account ID	<div></div>		<div></div>
SA ID	<div></div>		<div></div>
Tax ID	<div></div>		<div></div>

Checklist

Required for Tier

	Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div> Loan and Measure Criteria		SPP < 5yrs	Y	Y	Y	Do measures included in loan package meet a 5 year simple payback period (10 years for municipal clients)?
		Loan Limits	Y	Y	Y	Do total measure costs included in loan package meet the loan limits?
		Basic Lighting	Y	Y	Y	Do measures <u>not include</u> any "basic lighting" measures, as defined by PG&E?
		LED DLC	Y	Y	Y	If lighting is included, are products on the Design Lights Consortium- <del>Qualified Products</del> List?
		No ROB	Y	Y	Y	Is all equipment replacement "early retirement", e.g. all equipment to be replaced is still functional?

Required for Tier

	Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div> Costs		Cost Totals	Y	Y	Y	Have cost estimates been provided for all measures and activities included in the <del>project loan application?</del>
		Cost by Measure	Y	Y	Y	Are costs broken out by measure?
		Cost Buildups	N	N	Y	Are costs broken out by trade and/or by time vs. materials?
		Ancillary Costs	N	Y	Y	Do cost estimates include costs of all ancillary services <del>required by OBF program</del> , including QA provider, M&V provider if any, etc.?
		Utility Rates	Y	Y	Y	Have consistent utility cost rates and/or utility rate structure been provided, as used to calculate energy cost savings?
		TOU Rates	N	Y	Y	If demand reduction or demand shifting measures are included in <del>project loan application</del> , are TOU rates or rate structure provided?

Required for Tier

	Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div> Building Asset Data		Equipment List	Y	Y	Y	Has a list of existing equipment been provided for those measures included in the <del>project loan application</del> , with major characteristics?
		Photos	Y	Y	Y	Have equipment photos or images been provided to verify existing conditions?
		Equipment Data	N	Y	Y	Have equipment nameplate information, cut sheets, plans, or other supplementary technical asset documentation been provided to verify existing conditions?
		Trend Data	N	Y	Y	Has existing equipment trend data or list of trended points, where used for energy savings estimates, been provided?
		Audit	N	Y	Y	Has a building audit or site visit been conducted?
		Audit Report	N	Y	Y	Has a building audit or site visit report been provided which describes existing conditions and measure opportunities?
		Site Walk	N	N	Y *	Has a site visit been conducted by QA provider to verify existing conditions? (* Only if deemed necessary by QA provider.)

Required for Tier						
<div></div> Building Energy Data	Check	Item	Tier 1	Tier 2	Tier 3	Description
		12 mos. Data	Y	Y	Y	Has 12-months recent and continuous building energy data been provided for all energy use at the building? Through Share My Data.
		15-min Data	N	N	Y	Have 2 weeks of 15-minute whole-building and/or end-use energy been provided?
		End-use Data	N	N	Y	Has end-use energy data been provided for major building end-uses, either as directly submetered or estimated?
		Savings Amount	Y	Y	Y	Are energy savings reasonable when compared with total existing facility energy consumption, e.g. no more than 75% of a given end-use or 40% of total facility use?
		Demand Data	N	Y	Y	If demand reduction or demand shifting measures are included in <b>project loan-application</b> , does energy data include current building peaks by total and end-use?

Required for Tier						
<div></div> Energy Savings	Check	Item	Tier 1	Tier 2	Tier 3	Description
		Complete Calcs	Y	Y	Y	Are energy calculations provided for all measures for which energy savings are being claimed <b>in the loan-application?</b>
		Inputs	Y	Y	Y	Are energy calculations inputs and variables clearly described?
		Assumptions	Y	Y	Y	Are all assumptions stated clearly, and reasonable per typical engineering practice e.g. per ASHRAE Handbook of Fundamentals?
		Detail	Y	Y	Y	Are calculations provided in sufficient detail to verify their accuracy and completeness?
		Judgment	Y	Y	Y	Are calculations reflective of typical engineering practice and physical laws, e.g. per ASHRAE Handbook of Fundamentals?
		Weather	N	Y	Y	Is a weather file or sample weather file provided for calculations for non-lighting measures?
		Energy Model	N	Y	Y	Are calculations provided in spreadsheet 8760 or weather bin format, or as a calibrated energy model using publicly available energy software e.g. DOE-2?

Required for Tier						
<div></div> Installation Verification	Check	Item	Tier 1	Tier 2	Tier 3	Description
		Install Verif Plan	Y	Y	Y	Is a plan or description provided for the process that will be conducted to verify installation is in accordance with initial scope?
		Collected Data	N	Y	Y	Does the installation plan clearly state equipment and data points to be verified and checked post-installation?
		Update Savings	N	Y	Y	Does the installation plan clearly describe the method to update estimated energy savings if needed, e.g. if the installation varies from the initial plan?
		Testing / Cx	N	N	Y	Does the installation plan include planned functional performance testing or commissioning (Cx) for relevant systems, such as a Cx plan with a designated Cx Authority (CxA)?

Required for Tier						
<div></div> Measurement & Verification Plan	Check	Item	Tier 1	Tier 2	Tier 3	Description
		M&V Plan	Y	Y	Y	Is a Measurement & Verification (M&V) plan provided which describes process to verify savings post-installation over an extended period of time?
		Collected Data	Y	Y	Y	Does the M&V plan clearly state data to be collected to verify savings, including whole-building energy data?
		Trend Data	N	Y	Y	Does the M&V plan clearly list all trend data to be collected, point-by-point?
		Calibration	N	Y	Y	Is the plan to update calculations reflective of typical engineering practice and physical laws, e.g. per ASHRAE Handbook of Fundamentals?
		Regression	N	N	Y	Does the M&V plan include a description of regression method to establish baseline and final savings, if a regression is to be used? Does the regression adjust for both weather and occupancy e.g. per ASHRAE 100?
		ASHRAE 14	N	N	Y	Is the M&V plan generally compliant with ASHRAE Guideline 14?

Required for Tier						
<div></div> Operations and Maintenance	Check	Item	Tier 1	Tier 2	Tier 3	Description
		O&M Service	Y	Y	Y	Is Operations & Maintenance (O&M) activity or service included with post-installation services?
		O&M Description	Y	Y	Y	Is planned O&M described or O&M plan provided, e.g. in a typical scope of work or scope of service?
		O&M Activities	N	N	Y	Does O&M service include, at a minimum, on-site training, equipment manuals, and an annual site visit?
		O&M Cost	N	Y	Y	If O&M or retrocommissioning (RCx) is provided and included in <b>loan project</b> costs, is cost of service clearly stated and cost buildup provided?

Post-Install Checklist

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Checklist

Checklist		Required for Tier					
	Check	Item	Tier 1	Tier 2	Tier 3	Description	
<div></div>	Loan and Measure Criteria		SPP < 5yrs	Y	Y	Y	Do measures included in loan package meet a 5 year simple payback period (10 years for municipal clients)?
			Loan Limits	Y	Y	Y	Do total measure costs included in loan package meet the loan limits?
			Basic Lighting	Y	Y	Y	Do measures <u>not include</u> any "basic lighting" measures, as defined by PG&E?
			LED DLC	Y	Y	Y	If lighting is included, are products on the Design Lights Consortium <u>Qualified Products</u> -List?
			No ROB	Y	Y	Y	Is all equipment replacement "early retirement", e.g. all equipment to be replaced is still functional?

		Required for Tier					
		Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div>	Costs						Have final cost totals been provided for all measures and activities included in the <b>project loan application</b> ? Have full invoices, bills, or work orders provided to justify final costs?
			Cost Totals	Y	Y	Y	Are final costs broken out by measure?
			Cost by Measure	Y	Y	Y	Are final costs broken out by trade and/or by time vs. materials? Do final invoices, bills, or work orders provided align with this?
			Cost Buildups	N	N	Y	Are final costs broken out by trade and/or by time vs. materials? Do final invoices, bills, or work orders provided align with this?
			Ancillary Costs	N	Y	Y	Do costs invoices include costs of all ancillary services <b>required by OBF program</b> , including QA provider, M&V provider if any, etc.?
			Utility Rates	Y	Y	Y	(If changed) Have consistent utility cost rates and/or utility rate structure provided, as used to calculate energy cost savings?
			TOU Rates	N	Y	Y	(If changed) If demand reduction or demand shifting measures are included in <b>project loan application</b> , are TOU rates or rate structure provided?

		Required for Tier				
	Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div>	Building Asset Data	Equipment List	Y	Y	Y	Has a list of newly installed equipment been provided for those measures included in the <del>project loan application</del> , with major characteristics?
		Photos	Y	Y	Y	Have equipment photos or images been provided to verify post-installation condition?
		Equipment Data	N	Y	Y	Have equipment nameplate information, cut sheets, plans, or other supplementary technical asset documentation been provided to verify post-installation conditions?
		Testing	N	N	Y	Has evidence of equipment testing for functionality been provided, e.g. functional testing or commissioning (Cx)?
		Trend Data	N	Y	Y	Has installed equipment trend data been provided, where used for energy savings estimates, per initial application and M&V plan?
		Site Walk	N	N	Y *	Has a site visit been conducted by QA provider to verify post installation conditions? (* Only if deemed necessary by QA provider.)

		Required for Tier				
	Check	Item	Tier 1	Tier 2	Tier 3	Description
<div></div>		15-min Data	N	N	Y	Have 2 weeks of post-installation 15-minute whole-building and/or end-use energy been provided?
		End-use Data	N	N	Y	Has post-installation end-use energy data been provided for major building end-uses, either as directly submetered or estimated?
		Demand Data	N	Y	Y	If demand reduction or demand shifting measures are included in <b>project loan application</b> , does energy data include post-installation building peaks by total and end-use?

Required for Tier						
<div></div> Energy Savings	Check	Item	Tier 1	Tier 2	Tier 3	Description
		Complete Calcs	Y	Y	Y	Are energy calculations provided for all measures for which energy savings are being claimed <del>in the loan application</del> ?
		Inputs	Y	Y	Y	Are energy calculations inputs and variables consistent with initial application?
		Assumptions	Y	Y	Y	Are all assumptions consistent with initial application?
		Detail	Y	Y	Y	Are calculations provided in sufficient detail to verify their accuracy and completeness?
		Judgment	Y	Y	Y	Are calculations consistent with initial application?
		Weather	N	Y	Y	(If changed) Is a weather file or sample weather file provided for calculations for non-lighting measures?
		Energy Model	N	Y	Y	Are updated calculations provided in spreadsheet 8760 or weather bin format, or as a calibrated energy model using publicly available energy software e.g. DOE-2?
Required for Tier						
<div></div> Installation Verification	Check	Item	Tier 1	Tier 2	Tier 3	Description
		Install Verif Plan	Y	Y	Y	Has installation verification been conducted per the initial plan?
		Update Savings	Y	Y	Y	Have updated energy savings and calculations been provided, if needed?
		Functional Tests	N	Y	Y	Does installation verification include equipment functional testing reports, punch lists, and/or spot measurements as appropriate?
		As-Builts	N	N	Y	Are as-built drawings provided if appropriate?
		Cx	N	N	Y	Is a functional testing or commissioning (Cx) report included that documents testing performed, as appropriate?
Required for Tier						
<div></div> Measurement & Verification Plan	Check	Item	Tier 1	Tier 2	Tier 3	Description
		M&V Plan	Y	Y	Y	Has an updated M&V plan been provided, if project scope has changed?
Required for Tier						
<div></div> Operations and Maintenance	Check	Item	Tier 1	Tier 2	Tier 3	Description
		O&M Service	Y	Y	Y	Has O&M activity or service, e.g. training, been conducted post-installation per initial O&M service description in initial application?